



NOVOVIEW
SP-X
beyond comparison



REDIFFUSION
Simulation

The new era in advanced visual simulation

SP-X is a revolutionary new family of Computer Generated Image visual systems that provides totally new levels of realism and flexibility to meet a wide spectrum of military and civil training requirements.

Jointly developed and produced by the world's most successful CGI pioneering team, Rediffusion Simulation and Evans and Sutherland Computer Corporation, it represents a new era of design-to-cost modularity.

That modularity means SP-X is upward expandable from basic night/dusk to full color textured daylight and is compatible with all relevant display technology. So the SP-X range meets a broad spread of training applications for rotary, fixed wing and VTOL aircraft that includes initial, transition, upgrade and recurrent for the airlines, and mission capability with sensor simulation for the military.

It also more than meets all relevant international regulatory criteria.

Such capability centers on powerful new processing hardware that allows cost effective modelling to create real world gaming areas, airports and terrain with an inherently high scene capacity for

truly realistic natural and cultural features.

Special effects, animation, luminous and transparent surfaces, as well as two dimensional modulation texture combine to increase scene detail and realism by providing height and speed cues and simulation of weapon delivery effects, target acquisition, dynamic seascapes, low visibility and a host of environmental conditions.

While the system's ability to cope with dynamic co-ordinates, either in the air or on the ground, extends SP-X's tactical role as does its sensor simulation, and displaced eyepoint capability.

And height above terrain and collision detection features allow non-flat runways and terrain and have particular relevance in confined area landings, nap-of-the-earth and rotary wing applications.

SP-X, therefore, has the flexibility and performance to meet wide ranging training demands today and to grow with those demands tomorrow.

SP-X – beyond comparison.

1. Approach to Hong Kong.
2. Luminous polygons.
3. Textured daylight.
4. Pixel calculated fog.
5. Dusk approach.



Total training capability and flexibility

The design criteria of SP-X were based on detailed examination of current and future projections for visual related simulation and training demands. The result is a new architecture combining wholly innovative technology with the best of proven systems, the highly successful NOVOVIEW and CT ranges.

It is, therefore, considerably more capable than the current NOVOVIEW systems but in a price bracket that will attract both civil and military operators. And because SP-X is modular and expandable, it carries an unrivalled spread of configurations and options that give far reaching in-service benefits.

For example, because the number of pixels produced by an image generator impacts on both picture quality and price, an operator can select a pixel count appropriate to his training need and budget, secure in the knowledge that his system can be upgraded in line with those factors.

A key option is a two dimensional hardware texture which can be applied to any polygon regardless of its orientation in the scene. There are 32 patterns available and these are created by modulating the intensity, color or transparency characteristics of individual polygons. This allows complex detail to be created with maximum

efficiency. These texture maps may be

translated in real time for dynamic applications such as ocean waves.

Sophisticated data base management also enables optimum use of capacity with fade level of detail management, rapid refresh of active data base and overload management. While image quality is further ensured by comprehensive anti-aliasing algorithms.

In terms of operational capability SP-X is unique in combining calligraphic light points and raster lights allowing crisp night/dusk scenes, additional scene detail, such as light reflections, and use with non-calligraphic displays. Luminous polygons, straight, curved and random light strings are also available while brightness control incorporates random intensity to create highly realistic urban areas.

Representation of environmental conditions, too, benefits from technological advances such as pixel fog and haze, selectable intensity and directionally controlled horizon glow and sun shading.

SP-X, therefore, offers a vast array of features and options that enhance training quality.

SP-X – beyond comparison.

1. U.S.S. Nimitz in low visibility.
2. T-45 data base showing formation flight.
3. Transparent canopy.
4. Daylight approach to Nimitz.
5. Detail of Nimitz data base.



Synopsis of technical features

Rediffusion's SP-X is a revolutionary new family of computer generated image visual systems that provides outstanding levels of realism and flexibility for both military and civil applications.

The SP-X system features and options are:-

1. Well managed high scene content and capacity
2. Advanced texture
3. Programmable scan standards
4. Modular architecture
5. Image quality
6. Sophisticated illumination techniques
7. Special effects and animation
8. Highly realistic normal and adverse weather conditions
9. Height above terrain and collision detection
10. Displaced eyepoint cabability

1. Well Managed High Scene Content and Capacity

Large area (world coverage).

Data Base Management allows the scene content to be consistent with the display capacity.

- Level of detail management – blends detail in and out of the scene as the content changes with motion, keeping the highest scene detail closest to the eyepoint.
- Rapid refresh of active data base – allows continuous use of optimum polygon and lightpoint count.
- Overload management – Smooth handling of temporary overload without any perceptible image breakup.

2. Advanced Texture

The use of two-dimensional texturing in computer generated imagery has long been used in Rediffusion's NOVOWIEW and CT series to increase scene density. Like the CT6 system, SP-X has an expanded texture capability

whereby patterns can be applied to any polygon regardless of its orientation in the scene.

Operationally texture provides height and speed cues and a variety of peripheral information with particular advantages close to the ground such as in helicopter operations.

Modulation across two colors and also in intensity and transparency allows sophisticated detail to be created with maximum efficiency.

Up to 32 patterns are available per data base and two patterns can be applied to each polygon. These texture maps may be translated in real time for dynamic applications such as ocean waves.

3. Programmable Scan Standards

SP-X provides modular image resolution for design-to-cost flexibility.

The night/dusk system is available with 330,000 or 660,000 pixels per channel while the full daylight configuration can have 360,000 or 720,000. The choice of resolution does not effect other parts of the system such as polygon capacity or texture capabilities.

4. Modular Architecture

A new hardware architecture based on the CT series of highly sophisticated mission visuals

allows the SP-X system configuration flexibility to meet specific customer's needs and to expand as his simulation needs change. While extensive use of very large scale integration (VLSI) allows high performance at reasonable cost. At its most basic SP-X provides dusk/night grey surfaces with colored light points and at its most sophisticated full color textured day/dusk/night with colored light points.

5. Image Quality

Comprehensive anti-aliasing algorithms proven in the CT range prevent distracting display image anomalies such as scintillation of small surfaces and light points, quantization (stairstepping) of continuous scene elements and breakup of long narrow surfaces.

6. Sophisticated Illumination Techniques

In terms of operational capability SP-X is unique in combining calligraphic light points and raster lights. These not only provide crisp night/dusk scenes, they can also be used to model additional scene detail such as light reflections on a wet runway.

Straight, curved and random light strings are also available while brightness control includes

random intensity to create highly realistic urban areas.

Flashing, rotating, strobe and horizontal and vertical directional light points are available.

Luminous polygons can be used to create window and lit interiors such as aircraft hangars, floodlights and light pools.

7. Special Effects and Animation

Effects such as transparency, dynamic co-ordinates, blowing snow, dust, smoke, wakes, explosions, and baton ground control allow weapons delivery, refuelling, air-to-air, target acquisition and carrier scenarios.

8. Highly Realistic Normal and Adverse Weather Conditions

Added realism is provided by pixel calculated fog and haze, selectable intensity and directionally controlled horizon glow, sun shading, and a range of proven environmental effects.

9. Height Above Terrain and Collision Detection

The image generator feeds back to the host computer the distance from the eyepoint to the nearest polygon.

This allows use of non-flat

runways and terrain, for example, in confined area landing, nap-of-the-earth and rotary wing operations.

10. Displaced Eyepoint Capability

This allows periscope or sensor simulation with alternate polygon color where the two scenes are viewed from different eyepoints.

Conclusion

SP-X offers a wide range of configurations and feature options which provide the user with great flexibility in matching visual system capabilities to training requirements and budget.

NOVOWIEW

SP-X

beyond comparison

SPX allows detail to blend unobtrusively into and out of the scene.



Novoview SP-X 100/500 Systems Specification

	SP-X 100 NIGHT/DUSK	SP-X 500 NIGHT/DUSK	DAY
Polygons/Channel	250	500	500
Polygons/System	Approaches channel capacity x no. of channels		
Light points/Channel	5000	5000	1000
Light points/System	Approaches channel capacity x no. of channels		
Update rate (Field Rate)	30Hz	30Hz	50Hz*
Standard Resolution	330,000 pixels per channel	360,000 pixels per channel	
High Resolution	660,000 pixels per channel	720,000 pixels per channel	
Maximum channels	3**	8	

* Also available at 60 Hz.

** Expandable to 8 with hardware object manager.

Features

- Sub-pixel anti-aliasing
- Calligraphic or raster lights
- Light strings – straight, curved and random
- Light colors – 16 location color memory
- Polygon colors – 256 location color memory (separate from light colors)
- Alternate polygon color for sensor channel
- Fade level of detail
- Sun shading
- Modulation texture on any polygon
- Transparent polygons
- Luminous polygons
- Fog – Z depth per pixel
- Level of detail management
- Overload management
- Powerful data base development tools
- Up to 3 dynamic co-ordinate systems (Up to 13 with some system trade offs)
- Landing lights – 7 lobes, 5 lobes per channel

A **BET** ELECTRONICS COMPANY



REDIFFUSION

Simulation

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Continuous product improvement means that detail in